Dear Marco Gaetani, thank you for your feedback on the updated version of the manuscript.

In response to your first comment the title has been shortened. However, we believe that the regional climate model approach is an important part of the study, which should be highlighted in the title. Hence we propose the following reformulation of the title (see also the first page of the revised manuscript):

"Regional modeling of surface solar radiation, aerosols, and cloud cover spatial variability and projections over Northern France and Benelux"

It comprises 19 words (140 characters) instead of 23 words (161 characters) for the initial title.

In response to your second comment the abstract has also been shortened (now 253 words). The modified text, which can be found on the first page of the revised manuscript, is referenced below :

"Investigating current and future evolution of surface solar radiation (SSR) is essential in the context of climate change and associated environmental issues. We focus on the influence of atmospheric aerosols, along with cloud cover and water vapor content over northern France and Benelux in spring and summer. Our analysis relies on the CNRM-ALADIN64 regional climate model at 12.5 km resolution, which includes an interactive aerosol scheme. A regional evaluation of 2010-2020 ALADIN hindcast simulations of clear-sky and all-sky SSR, clear-sky frequency and aerosols, by comparison to coincident multi-site ground-based measurements shows reasonable agreement. In addition, these hindcast simulations emphasize how elevated aerosol loads over Benelux and high cloud cover over southwestern England reduce the SSR. Additional ALADIN climate simulations for 2050 and 2100 under CMIP6 SSP1-1.9 predict a significant reduction of aerosol loads compared to 2005-2014, especially over Benelux, associated with future increases in clear-sky SSR but geographically limited all-sky SSR evolution. In contrast, under SSP3-7.0, clear-sky and all-sky SSR is projected to decline significantly over the domain. This decline is maximum in spring over Benelux due to combined increases of cloud cover and nitrate aerosols projected from 2050 onwards. In summer, projected decreases of cloud cover largely attenuate the reduction of SSR due to aerosols in 2050, while by 2100 rising water vapor contents counteract this attenuation. Thus, our results highlight seasonally and spatially variable impacts of future anthropogenic aerosol emissions on SSR evolution, due to cloud cover and water vapor modifications that will likely largely contribute to modulate forthcoming aerosol influences."